We Claim:

1. A device for hybridization reaction between a target molecule in a fluid and a probe, which comprises:

a microfluidic channel comprising a first portion and a second portion following said first portion, wherein said first portion has an irregular cross section and said second portion has a probe, and

a fluid driving element connected the ends of said channel with tubes, wherein said fluid element can move said target molecules back-and-forth for repeatedly passing through said second portion.

2. The device of claim 1, wherein said irregular cross section is produced by irregularly changing the size of the cross section of said first portion of said channel.

3. The device of claim 1, wherein the inner surface of said microfluidic channel is rough or has recess slots.

4. The device of claim 1, wherein said probe is nucleic acid, peptide or peptide nucleic acid.

5. The device of claim 4, wherein said nucleic acid is DNA or RNA.

6. The device of claim 4, wherein said nucleic acid is single-stranded nucleic acid or double-stranded nucleic acid.

7. The device of claim 1, which further comprises a means for providing energy to said target molecules.

8. The device of claim 1, which can be used in removing the target molecules non-specific binding to said probes.

9. A process for increasing hybridization reaction between a

target molecule and a probe, comprising the following steps:

(a) providing a microfluidic channel comprising a first portion and a second portion following said first portion, wherein said first portion has an irregular cross section and said second portion has a first probe and second or more probes wherein said first probe specific binds to said target molecule;

(b) introducing a fluid containing said target molecule into the microfluidic channel of the device for hybridization reaction of the invention;

(c) driving said fluid to flow back and forth so that said target molecule can repeatedly pass through said second portion, whereby said target molecules non-specific binding to the second or more probes are removed and the target molecules binding to first probe are retained.

10. The process of claim 9, wherein said probe is nucleic acid, peptide or peptide nucleic acid.

11. The process of claim 10, wherein said nucleic acid is DNA or RNA.

12. The process of claim 10, wherein said nucleic acid is single-stranded nucleic acid or double-stranded nucleic acid.

13. The process of claim 9, wherein the surface of said channel is rough.

14. The process of claim 9, wherein said irregular cross section is produced by irregularly changing the size of the cross section of said first portion of said channel.

15. The device of claim 9, which further comprises a step for providing energy to said target molecules.